Docket ITC:9905

INTERACTIVE BILLING SYSTEM UTILIZING

A THIN WEB CLIENT INTERFACE

by

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CROSS-REFERENCE TO RELATED APPLICATIONS

This application is related to the following co-pending U.S. Patent Applications which are hereby incorporated by reference:

Application No.	Filing Date	Title
Docket ITC:9901	1/29/99	Integrated Message Storage and Retrieval System Distributed Over a Large Geographical Area
Docket ITC:9902 (Attorney Docket No. ITC1P002?)	1/29/99	A SYSTEM AND METHOD FOR PROVIDING UNIFIED MESSAGING TO A USER WITH A THIN WEB BROWSER
Docket ITC:9903 (Attorney Docket No. ITC1P001)?	1/29/99	CENTRALIZED COMMUNICATION CONTROL CENTER AND METHODS THEREFOR
Docket ITC:9904	1/29/99	COMPUTER-IMPLEMENTED CALL FORWARDING OPTIONS AND METHODS THEREFOR IN A UNIFIED MESSAGING SYSTEM
Docket ITC:9905	1/29/99	INTERACTIVE BILLING SYSTEM UTILIZING A THIN WEB CLIENT INTERFACE
Docket ITC:9906	1/29/99	A SYSTEM AND METHOD TO MANAGE PHONE SOURCED MESSAGES

Docket ITC:9907	1/29/99	METHOD AND APPARATUS FOR NETWORK INDEPENDENT INITIATION OF TELEPHONY
Docket ITC:9908	1/29/99	APPARATUS AND METHOD FOR DEVICE INDEPENDENT MESSAGING NOTIFICATION
Docket ITC:9909	1/29/99	APPARATUS AND METHOD FOR CHANNEL-TRANSPARENT MULTIMEDIA BROADCAST MESSAGING
Docket ITC:9910	1/29/99	Voice Access Through a Data-Centric Network to an Integrated Message Storage and Retrieval System

MSD17

Definition of Terms

Data-centric network: a network that carries digital data, primarily to facilitate information exchange among computers and computer peripherals. Examples include distributed computer networks such as the Internet.

Telephony-centric network: a network that carries telephony information such as voice, fax, page messages, and the like, primarily to facilitate information exchange among telephony devices.

Message: a communication which may be transmitted via either the data-centric network or the telephony-centric

network. Examples include voicemail, e-mail, facsimile, page, and the like.

Telecommunication device: POTS telephone, cellular telephone, satellite telephone, web telephone, PC (desktop and laptop), web surfer, personal digital assistant (PDAs), facsimile machine, teletype, modem, video telephone, set top telephone.

Web telephone: a telephone implemented via a computer that is coupled to the data-centric network. An example is a PC with microphone, speaker and internet connection.

Set top telephone: a telephone set coupled to a cable-based set top box, bypassing the local telco provider. The cable-based system may be provided by, for example, WebTV, TCI cablevision.

Web surfer: an Internet-ready PC with a network connection and pre-installed web browser.

PDA: personal digital assistant, e.g., Palm Pilot available from 3COM.

Thin Web Client: A commonly employed web browser such as Internet Explorer or Netscape Navigator - JAVA enabled.

PSTN: Public Service Telephone Network, e.g., AT&T, MCI, Sprint-owned telco

GUI: graphic user interface

POTS: plain old telephone service

NOC: Network Operations Center

POP: point of presence, e.g., co-location at a local telco switch or at a company controlled area with T1 connections to a local switch.

WPOP: Web POP

VPOP: Voice POP

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates in general to the field of telecommunications services billing, and more particularly to an apparatus and method for providing online access to transaction details and corresponding charges relating to a telecommunications account.

2. Description of the Related Art

The advent of the telephone at the turn of the century presented a new form of communicating to the population at large. Whereas prior communications between individuals occurred either in person or through the mail, the introduction of the telephone into both the household and business cultures changed the way that people work, play, and interact. More urgent matters were treated immediately with a telephone call while less important matters were relegated to the mail.

Initially, the coverage of the telephone network allowed a user to make local calls only, and that with intervention of an operator. Early use was therefore limited. As coverage of the telephone network began to connect major regions of the country together, long distance calling became an option. Yet, this option as well enjoyed only limited use by the population at large, primarily because of the cost involved with making a long distance, or toll, call. When a toll call was made, because the user had to interact with an operator in order to place the call, he/she was aware of the costs involved.

Direct dialing technology took the operator out of the toll calling loop. As a result, the cost for making a toll call was reduced extensively. More and more users began treating long distance telecommunications as the commodity it has become today. As a consequence of increased use, it became vital for prudent household/business money managers to analyze and reconcile each month's long distance bill. As in any other venture for profit, the management of bottom line costs is effected by careful scrutiny of the details. Early long distance bills were not difficult to analyze because 1) there was only one long distance vendor; and 2) most businesses and households only had one telephone line.

Two parallel progressions over the past 20 year have simply revolutionized personal and business telecommunications practices. The first progression was the introduction of competition into the telecommunications marketplace. Today, literally hundreds of telecommunications companies advertise over the full gamut of telecommunications services. In any given area of the United States, a user can choose from at least 25 long distance service providers. Competition has resulted in the dramatically low cost of long distance that is seen today.

Long distance calls are now billed by the minute, and cost less than 10 cents per minute.

The proliferation of computer technologies in both the telecommunications industry and by telecommunications subscribers is the second progression in recent history to transform personal and business practice. Facsimile machines, pagers, multi-line telephone systems, voice mail, cellular telephones, and computer networking over the internet are now ubiquitously employed in average households and businesses. It is not uncommon today to find, numerous telephone lines in a given home, some for personal use, some for business use, each replete with a cornucopia of features provided by numerous telecommunications service companies.

But while competition and technological advances have made telecommunications services more accessible and affordable, both of these two progressions have exponentially exacerbated the money management problem. In the 1980's, as these two progressions were still in their early stages, the average subscriber would receive a separate bill from each provider for each line every month. All of the providers, because they were part of the overall telecommunications network, communicated with local

telephone network interface equipment each time a call was placed. Details of the call, or transaction, would be recorded so that an itemized bill would result at the end of the billing period. Consequently, a subscriber having two lines, one with Long Distance Company A and the other with Long Distance Company B, would receive a bill each month from each of the companies.

Service providers over the next few years took the initiative to negotiate shared billing agreements with local telephone companies to reduce the burden on the consumer. Today, a subscriber receives one monthly bill for telecommunications services. This consolidated bill presents all charges for lines within the subscriber's household/business and additionally itemizes each charge. Consolidated billing techniques allow a present day money manager to more easily analyze and reconcile telecommunications costs—that is, *ex post facto*. This is because a consolidated bill typically itemizes charges for telecommunications services that have occurred over the previous 30 days.

Because telecommunications assets and services can be easily accessed, they also can be easily abused. For

instance, newspapers routinely contain reports about some business or family that received a horrendously large phone bill as a result of an abuse such as a pirated calling card or excessive access of a 900 number. Accordingly, prudent money managers are now demanding up-to-date information as well as detailed information in order to better control costs and to precipitate abusive use patterns.

Many telecommunications service providers today allow a user to access account information over the internet via a web browser, yet the information that is provided online is at a summary level only (i.e., total charges) and is furthermore merely a reflection of costs that were provided in a previous consolidated bill. In summary, present day online telecommunications billing systems provide no meaningful benefits to a user other than presenting an unpretentious reminder to pay an outstanding balance.

Therefore, what is needed is an apparatus that allows a user to access detailed, up-to-date telecommunications charges for a consolidated account via a web browser.

In addition, what is needed is an apparatus whereby a user can access telecommunications transaction records

associated with his/her account that have been recorded since a previous consolidated bill was issued.

Furthermore, what is needed is an online billing mechanism that allows a user to view individual telecommunications transaction records associated with a consolidated account.

Moreover, what is needed is a method for displaying, searching, and monitoring individual transactions in a consolidated telecommunications account via a web browser.

In addition, what is needed is a billing, monitoring, and alert system that is user configurable, that alerts a user when a preset long distance threshold is reached.

SUMMARY

To address the above-detailed deficiencies, it is an object of the present invention to provide an apparatus for accessing near-real-time telecommunications transaction records over the internet via a thin web client program.

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Accordingly, in the attainment of the aforementioned object, it is a feature of the present invention to provide an apparatus for presenting, searching, and monitoring

telecommunication transaction records via a thin web client interface. The apparatus includes a billing server and a web server. The billing server maintains the telecommunication transaction records and queries the telecommunication transaction records in response to a request for prescribed data. The web server is coupled to the billing server. The web server sends telecommunication transaction information to the billing server, it requests the prescribed data in response to a user command via the thin web client interface, and it provides the prescribed data to a user via the thin web client interface. The prescribed data is at a level of detail sufficient to distinguish a first telecommunication transaction record from a second telecommunication transaction record.

An advantage of the present invention is that a money manager can access the details online that are needed to properly analyze and reconcile communications charges.

Another object of the present invention is to provide an apparatus that gives a subscriber the ability to access telecommunications charges for his/her account that have been entered since a previous consolidated bill was issued.

In another aspect, it is a feature of the present invention to provide an interactive telecommunications billing mechanism. The interactive telecommunications billing mechanism has a billing server and a web server. The billing server maintains a transaction data base and queries the transaction data base to retrieve selected transaction records that match parameters of a query. Each of the selected transaction records includes a line field, a number field, a place field, and a cost field. The line field documents a first telephone number from which a call originates. The number field documents a second telephone number to which the call is placed. The place field documents a location corresponding to the number field. The cost field documents a cost of a corresponding call event. The web server is coupled to the billing server. The web server provides the query in response to a user command received from a data network and transmits the selected transaction records to a user over the data network for viewing via a web browser.

Another advantage of the present invention is that a user does not have to wait for a monthly bill to arrive in order to scrutinize his/her telecommunications account.

A further object of the invention is to provide an online billing apparatus that allows a user to search a consolidated account and to view individual telecommunications transaction records associated with the search.

In a further aspect, it is a feature of the present invention to provide an apparatus for accessing selected telecommunications records over the internet from a user computer that is executing a web browser application. The apparatus includes a billing server and a web server. The billing server maintains telecommunications records and provides the selected telecommunications records in response to a user request. The billing server has data base logic, maintenance logic, and query logic. The data base logic stores the telecommunications records. Each of the telecommunications records documents a specific telecommunications event. The maintenance logic provides the data base logic with a new telecommunications record corresponding to a new telecommunications event. The query logic searches the telecommunications records in accordance with parameters prescribed by the user request and retrieves the selected telecommunications records. The web server is

coupled to the billing server. The web server receives the user request over the internet and provides the selected telecommunications records to the user computer over the internet.

A further advantage of the present invention is that a user does not require special software applications to view detailed telecommunications charges over the internet.

Yet another object of the present invention is to provide a method for displaying, searching, and monitoring individual transactions in a consolidated telecommunications account via a thin web client interface.

In yet another aspect, it is a feature of the present invention to provide a method for providing access to telecommunications billing records in a billing computer over the internet, the access being obtained via a remote computer that is executing a thin web client application. The method includes maintaining the telecommunications billing records in a data base, the telecommunications billing records documenting individual telecommunication events; transmitting a search parameter entry web page to the remote computer over the internet; receiving a completed

search parameter entry web page from the remote computer over the internet; querying the data base in accordance with parameters provided by the completed search parameter entry web page; and transmitting a search results web page over the internet to display the telecommunications billing records on the remote computer.

Yet another advantage of the present invention is that a subscriber can detect unauthorized charge patterns before excessive charges are accumulated.

In yet another aspect, it is a feature of the present invention to provide a method for providing a user with detailed long distance telephonic transaction information via a thin web client. The method includes providing a data server, coupled to local telephone switches, for tracking long distance telephone transactions for a plurality of telephone numbers; providing a web server, coupled to the data server, for presenting to the user the detailed long distance telephonic transaction information; and providing the user with a customizable event monitor, coupled to the web server and to the data server, the event monitor for alerting the user when telephone transactions meet a specified criteria.

It is a further feature of the present invention to provide a long distance transaction event monitor, coupled to a telephone network, for alerting a user when specified alert criteria relating to telephony transactions have been met. The event monitor includes a web interface, for allowing a user to specify the alert criteria; query logic, coupled to the web interface, for causing the specified alert criteria to query the telephony transactions; and an event monitor, coupled to the query logic, for generating alert messages to the user when the query logic determines that the specified alert criteria is met by the telephony transactions.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other objects, features, and advantages of the present invention will become better understood with regard to the following description, and accompanying drawings where:

FIGURE 1 is a diagram illustrating related art billing techniques for telecommunications services.

FIGURE 2 is a diagram illustrating a related art telecommunications services account summary provided over a thin web client interface.

FIGURE 3 is a diagram illustrating an interactive, consolidated billing mechanism according to the present invention.

FIGURE 4 is a block diagram depicting details of a billing server according to the present invention.

FIGURE 5 is a diagram illustrating a payment options web page provided via a thin web client.

FIGURE 6 is a diagram illustrating an account options web page provided via a thin web client.

FIGURE 7 is a diagram illustrating a transaction search/monitor web page provided via a thin web client.

FIGURE 8 is a diagram illustrating a search results web page provided via a thin web client.

FIGURE 9 is a flow chart illustrating a method according to the present invention for providing online access to near-real-time details and charges corresponding to a telecommunications account.

DETAILED DESCRIPTION

In light of the above background on telecommunications billing techniques, several related art examples will now be discussed with reference to FIGURES 1 and 2. These examples illustrate how present day online billing systems for telecommunications services encumber a user in two ways: First, because online access to accounts is provided only at the summary level, the user is prohibited from performing any significant use or cost analyses—a significant function that is regularly performed in a number of small businesses. Second, because present day billing systems update online accounts only at the end of each billing cycle, the user is unable to detect usage and corresponding charges until his/her account is updated. Following this discussion, a detailed description of the present invention will be provided with reference to FIGURES 3 through 9. The present invention provides a user with online access to detailed, near-real-time transaction data associated with his/her telecommunications services account.

Referring to FIGURE 1, a diagram 100 is presented illustrating related art billing techniques for telecommunications services. The block diagram 100 shows

two local telephone network interfaces 112, one 112 at POINT A and one 112 at POINT B. The block diagram 100 also depicts telecommunication devices connected to the local telephone network interfaces 112: a telephone 102, pager 108, a facsimile (fax) machine 110, and a modem 106 that provides connectivity for a computer 104. In addition, a telecommunications channel 114 connects the two local telephone network interfaces 112. The telecommunications channel 114 represents any of a number of channel mediums in use today for the transmission of telephonic data to include metallic and fiber-optic landline, line-of-sight microwave, and satellite communication channels. The diagram 100 also shows a central billing system 118 that is coupled to both of the local telephone network interfaces 112 via a billing network 116. Furthermore, the diagram 100 illustrates the three evolutionary techniques used by the central billing system 118 to invoice customers: an early technique involving preparation of separate bills 120, a consolidated account technique involving a consolidated bill 122, and an online technique involving online presentation of a bill summary 124.

In operation, each of the devices 102, 108, 110, 106/104 have a unique telephone number, or line number, for addressing and identification by the local telephone network interface 112. The local telephone network interface 112 is also known as a local switch 112. The local switch 112 is the point where local devices 102, 108, 110, 106/104 interface to the telephone network channel 114. A transmitting local device, say a telephone 102 at POINT A, places a call to a compatible receiving device, say a telephone 102 at POINT B, by providing the telephone number assigned to the receiving device 102 at POINT B to the local switch 112 at POINT A. The local switch 112 at POINT A then routes the call to the local switch 112 at POINT B over the telephone network channel 114. The local switch 112 at POINT B then routes the call to the receiving device 102. The placement of the call, through completion of the call, is known as a line transaction, or transaction. A transaction is typically placed between an initiating device, or calling number, and a receiving device, or called number, however, a transaction can also take place between several devices. Such a transaction is known as a conference call.

It is customary in the telecommunications industry to pass along the cost of telecommunications transactions to customers. Often, the cost of local calls is billed to a customer for a flat monthly fee. The cost of some types of calls, say a call to directory assistance, is billed on a per transaction basis. The cost of other types of calls, toll calls, is billed according to call duration, and possibly distance. Moreover, the billing rates associated with all of the above call types are determined based upon a number of complex factors present in a competitive, yet publicly regulated, market environment.

Prior to the 1980's, virtually all of the commercial telecommunications services in the United States were provided by a single telecommunications company. Since the breakup of that telecommunications company, competition in the industry has flourished. In any given city today, a customer can select portions of his/her telecommunication service package from upwards to a 100 different companies. For example, the customer may choose Company A to provide local line service, company B to provide long distance toll service, Company C to provide cellular telephone service, and Company D to provide paging service. Although such

competition is healthy, because each of these service providers utilize elements of the telecommunications network 102-114 in whole or in part, a strict accounting of each telecommunication transaction must be maintained so that each of the service providers can properly apportion transaction costs to its customers.

The central billing system 118 is the focal point for transaction accounting. Coupled to each local switch 112 via the billing network 116, typically a high speed data network 116, the central billing system collects data for each telecommunications transaction within its scope of coverage. For example, when a long distance call is placed from a telephone 102 in City X to a telephone 102 in City Y, the central billing system 118 generates and stores a transaction record for the long distance call. Elements of the transaction record generally include calling number (or line number), called number, place called, date and time of the call, and duration of the call. Additionally, each transaction record within the central billing system is mapped to a customer and a service provider for the transaction.

Periodically, each service provider bills its customers for services provided during a given period, the given period typically being a month in duration. The early invoicing technique shown in the diagram 100 was predominately used during the 1980's and resulted in a series of bills 120 being issued from each service provider. For example, in any given month, Company A would access the central billing system 118 to retrieve transactions earmarked for Company A's services. In turn, Company A would manually print and mail invoices 120 to its customers for payment. A customer would receive an invoice 120 from Company A for each of his/her line numbers and each of the invoices 120 would include individual transaction details as described above in support of the total invoiced amount. Likewise, Company B, Company C, and Company D would issue invoices 120 to their customers. Consequently, a particular individual would receive multiple bills 120 for each line number. Although multiple bills 120 for similar services causes inconvenience, because each of the bills 120 contained detailed transaction information, the customer could at least scrutinize the bills 120 to ensure that unauthorized or duplicate charges were not present. A household or small business in the 1980's normally had one

or two lines. At most, this resulted in having to analyze and pay two telecommunications service bills 120 from a single company at the end of each month.

In the late 1990's, it is not uncommon to find information-based cottage industries running entirely out of a home office located in a spare bedroom. As a result of advances in the communications industry, particularly those advances resulting in what is today known as the internet, or world wide web, an individual or small business in the 1990's may have a number of lines: two home lines, a home computer line, a fax line, two to three business lines, a cellular phone line, and a pager line. In addition to the multiplicity of lines, the individual or small business may provision telecommunications services for each of the lines to a different telecommunications service provider. What once was a tolerable analysis and reconciliation exercise at the end of each month quickly became intolerable.

Customer pressure provided the impetus for the telecommunications billing standard in use today: the consolidated bill 122. Now, rather than receiving numerous bills 120 at the end of each month, a telecommunications service customer receives a consolidated bill 122. With

rare exception, lines and related services are mapped in the central billing system 118 to a customer account number. At the end of each billing cycle, a consolidated bill 122 is printed and mailed to the customer for payment. The consolidated bill 122 includes sections for each service provider and each section contains subsections for each line in the account. Each line subsection of the consolidated bill 122 contains individual transaction details as described above in support of the total invoiced amount. Hence, rather than analyzing and reconciling multiple telecommunication invoices, a customer need only analyze one, albeit complex, invoice at the end of each month.

Because an increasing number of homes and businesses are connected to the Internet, more recent developments in the industry find a few telecommunications services providers allowing their customers to access billing information online. Yet, because this billing technique is still in its early stages, present day online billing systems actually provide fewer benefits than the consolidated billing technique. In theory, a user ought to be able to access up-to-date transaction details for his/her

telecommunications account in a consolidated format. But this is simply not the case.

Instead, what the user is presented with is simply a summary 124 of his/her consolidated bill 122—the consolidated bill 122 is still used as the primary billing vehicle for a consolidated account. The summary 124 is provided as a web page authored in hypertext markup language (HTML).

Most personal computers today are equipped with general purpose internet communication applications known as thin web clients, or web browsers. For example, either Microsoft® Internet Explorer or Netscape® Communicator applications are found on virtually every present day desktop system. Either of these thin web clients is capable of receiving an HTML-authored web page from a server over the internet and displaying contents of the web page for the user on his/her desktop computer. A web browser is also capable of transmitting data input by the user back to the server over the internet. Hence, to access literally millions of different web sites over the internet, the user need only execute a web browser. The responsibility belongs to designers of a particular web site to provide the web

pages and processing capabilities required for a user to interact effectively and efficiently with the site, without a constraint that special software be installed on the user's computer.

Although data networks are used extensively in the telecommunications industry for other applications, internetworking techniques and capabilities with regard to billing are present now only in rudimentary forms. One skilled in the art will appreciate that for a telecommunications service provider to provide the online summary 124 shown in FIGURE 1 over the internet requires only minor enhancements to the central billing system 118 over that required to print and mail a consolidated bill 122. Furthermore, because the online summary 124 is at a summary level, it is virtually useless for purposes of analysis and reconciliation. The present day online summary billing technique is more specifically described with reference to FIGURE 2.

Referring to FIGURE 2, a diagram 200 is presented illustrating a related art telecommunications services account summary 210 provided over a thin web client interface. The diagram 200 depicts a display 202 provided

by the thin web client, in this example the Internet Explorer, that features presentation of an account summary web page 210 provided by U.S. West, a telecommunications services provider. Although Internet Explorer is featured as a web browser in this and following drawings, one skilled in the art will appreciate that any HTML-compatible web browser allows display HTML-authored web pages such as the one 210 depicted in this diagram 200. The account summary web page 210 includes title text 211, latent charges caveat text 212, summary level caveat text 213, account number text 214, total new charges text 215, and total amount due text 216.

Operationally, a user accesses the account summary web page 210 by providing a universal resource locator (URL) to the web browser that corresponds to the service provider, in this case the URL is http://www.uswest.com, which is simply an alias for an Internet Protocol (IP) address that is assigned to a data network server that routes data packets for the service provider. Typically, the user is presented with a sequential series of web pages from which he/she must select options. Once a "view online bill summary" option is selected, he/she is provided with the account summary web

page 210 by the data server over the internet. Additionally, most billing systems require some type of identification and authentication data that is provided by the user to preclude unauthorized access to private account information.

A present day billing system typically maintains a small data base of account summary data for all customer accounts. The account summary data is updated as consolidated bills are printed and mailed, but not more frequently. Because of this, the latent charges caveat text 212 is displayed on the account summary web page to warn the user that there may be latent telecommunications transactions that will remain unobservable until the next update of the account summary data. The account number text 214 is provided to indicate that the information displayed relates to a consolidated account rather than individual lines. Both the title text 211 and the summary level caveat text 213 warn the user that the charge information provided via the web page is at a summary level only—no detail is provided at the transaction level. The total new charges text 215 and total amount due text 216 are provided on the

page to inform the user of his/her current outstanding balance or credit.

It is significant at this point to two several observations regarding present day online telecommunications billing techniques. First and foremost, they simply serve as a supplemental medium for summarizing information that is otherwise provided to a customer in written form. Second, the information provided by an online account summary 210 is not up-to-date, that is, account transactions that occur prior to generation of the next month's consolidated bill are not reflected on the account summary web page 210. Both of the above limitations serve to impede a customer from accessing useful information regarding his/her account. A present day user desires that up-to-date, or near-real-time, account information be provided online at a level of detail that is sufficient enough to perform use and reconciliation analyses. The present day user, for example, would incorporate near-real-time charges into expense prediction models so that payment assets can be more readily managed. And it is particularly important that businesses be privy to transaction details so that assets of the business can be more effectively allocated. In addition, by monitoring

near-real-time charges, alerts may be provided to a user as preset thresholds are reached.

The present invention overcomes both of the limitations cited above by employing a billing server that maintains a transaction level data base that is updated in near-real-time for each customer account. Furthermore, online access to transaction records within the data base is provided to authorized users via a web server. The present invention is more completely described with reference to FIGURES 3 through 9.

Now referring to FIGURE 3, a diagram 300 is presented illustrating an interactive, consolidated billing mechanism according to the present invention. The diagram 300 depicts a billing server 302 and a web server 304 located at a network operations center. The web server is connected to a data network 306. In one embodiment, the data network 306 is the internet wherein TCP/IP protocol is used to exchange information between computers. In an alternate embodiment, the data network 306 is a private packet-switched network. The diagram 300 also depicts two local telephone switches 350, like those shown in FIGURE 1. A telephone network server 308, or local point of presence (pop) 308 is coupled

to each local switch 350. The local pops 308 are connected to the web server 304 via the data network 306. The diagram 300 also shows a user computer 312, executing a thin web client application, that is connected to the data network 306. A user 310 is shown viewing his/her detailed telecommunications account information via web pages 314, 316.

In operation, provisioned lines (i.e., telephone numbers that have been assigned to a long distance service) are monitored by the local pops 308. When a telephone network device corresponding to a provisioned line participates in a telecommunications transaction, the corresponding local pop 308 transmits information describing the transaction over the data network 306 to the web server 304 at the network operations center. The information includes calling number, called number, date, time, call duration, and type of call (i.e., direct dialed, calling card, reversed charges, etc.). The web server 304 provides the transaction information to the billing server 302 which, in turn, generates a new transaction record documenting the telecommunications transaction. In addition to the above information, the billing server 302 generates other

information for inclusion in the new transaction record such as the place called, account number, and cost of the transaction. The new transaction record is stored within the billing server 302. Hence, near-real-time telecommunication transaction records are maintained within the billing server.

A user 310 interactively accesses his/her consolidated account information by querying the data base of transaction records in the billing server 304 via a transaction search/monitor web page 314 that is provided by the web server 304 to the user computer 312 over the data network 306. Results of the query, that is, selected transaction records matching the parameters of the query, are provided for display on the user's computer 312 via a search results web page 316. The user 310 is provided with the ability to view transaction details corresponding to his/her consolidated account rather than simple summary level information. In addition, because the user 310 is allowed to query the data base of transaction records, the information he/she receives relating to cost and usage for his/her account is up-to-date.

Now referring to FIGURE 4, a block diagram is presented depicting details of a billing server 400 according to the present invention. The billing server 400 includes data base logic 410 that stores telecommunications transaction records 412. In one embodiment, the data base logic 410 is a hard disk. The billing server 400 also includes query logic that retrieves selected transaction records 412 from the data base logic 410 in response to a query request provided over bus 402. The billing server also includes maintenance logic 420 that updates the data base logic 410 with a new transaction record 412 when a new telecommunications event has occurred. The billing server additionally has a batch processor 440 that is coupled to the query logic 430. The billing server furthermore includes an event monitor 450 that is coupled to the query logic 450 and bus 402. Bus 402 provides communication of messages and commands between the billing server 400 and a web server (not shown). In one embodiment, bus 402 is a local area network (LAN).

Operationally, transaction details for each new telecommunication event, as described above, are provided to the maintenance logic 420 via bus 402. The maintenance

logic generates a new transaction record 412 and causes the record 412 to be stored in the data base logic 410. The query logic 430 is used to retrieve selected transaction records from the data base logic 410. A query is initiated from either a user request provided via the bus 402, the event monitor 450, or the batch processor 440. In one embodiment, query parameters are provided in accordance with the Open Data Base Connectivity (ODBC) set of standards.

When a user initiates a query of the data base logic 410 via a web page interface, the query parameters are received via bus 402. The query logic 430 retrieves selected transaction records 412 that satisfy the query parameters and provides these records 412 to the web server via bus 402. The web server subsequently inserts the selected transaction records 412 into a search results web page and transmits the web page to the user over the data network (not shown).

The batch processor 440 automatically generates queries periodically for the purpose of formal billing. In one embodiment, formal billing records 414 are also stored within the data base logic 410 so that simple user requests to view former consolidated bills can be easily retrieved.

The event monitor 450 causes specified queries to be routinely issued to the query logic 420 until a specified condition is met. An exemplary condition is when a particular dollar, or time threshold is met, for a particular number that is tracked by the event monitor 450. When query results detect that the condition is met, the event monitor 450 then provides an alert message via bus 402 so that a user can be notified via a voicemail message, a fax, or an email message. The web server then provides the specified alert to the user. For example, the event monitor 450 may be preset to allow $75/month of long distance calls to a particular out-of-state telephone number. When that amount of billing is reached, the user may preset the event monitor 450 to alert him/her, and possibly to disable any further long distance for the month.

Now referring to FIGURE 5, a diagram 500 is presented illustrating a payment options web page 510 according to the present invention. Like the web page 210 discussed with reference to FIGURE 2, the payment options web page 510 is provided by the web server (not shown) over a thin web client interface. The diagram 500 depicts a display 502

provided by the thin web client. The payment options web page 510 includes a web payment selection radio button 512.

Operationally, a user accesses the payment options web page 510 by providing a universal resource locator (URL) to his/her web browser as was described earlier. To enable automatic payment and access to consolidated account information via the internet, the user is required to select the option specified by the web payment selection radio button, in addition to completing the remaining fields shown on the web page 510. The completed web page 510 is transmitted back to the web server and the billing server in turn updates the account data base to allow the user access to his/her account data online.

Now referring to FIGURE 6, a diagram 600 is presented illustrating an account options web page 610 according to the present invention. The diagram 600 depicts a display 602 provided by the web browser on a user computer. The account options web page 610 includes a view statement hyperlink 612, a search statement hyperlink 614, and a monitor/alert hyperlink 616.

When the account options web page 610 is displayed on the user computer, the user can select to view a formal billing statement online by selecting the view statement hyperlink 612. The user can opt to query his/her account online by selecting the search statements hyperlink 614. The user can alternatively choose to specify conditions for monitoring his/her account by selecting the monitor/alert hyperlink 616.

Now referring to FIGURE 7, a diagram 700 is presented illustrating a transaction search/monitor web page 710 according to the present invention. In one embodiment, selecting either the search statements hyperlink 614 or the monitor/alert hyperlink 616 on the web page 610 presented in FIGURE 6 brings the user to this web page 710. In an alternative embodiment, selecting the monitor/alert hyperlink 616 directs the user to an alert configuration web page (not shown). The diagram 700 depicts a display 702 provided by the web browser on a user computer. The transaction search/monitor web page 710 allows the user to enter parameters for a query to his/her account. In the embodiment shown in the diagram 700, the user is allowed to enter query parameters related to line (i.e., calling

number), number (called number), place (place called), and cost. Standard structured query language (SQL) operators are provided via drop down menus on the web page 710. In addition, the user is allowed to modify a medium for alerts via the event monitor. The completed web page 710 is then transmitted to the web server for execution of the prescribed query via the billing server.

Now referring to FIGURE 8, a diagram 800 is presented illustrating a search results web page 810 according to the present invention. The diagram 800 depicts a display 802 provided by the web browser on a user computer. The search results web page 810 includes an account field 812, calling number fields 814, and transaction record fields 816.

The billing server returns selected transaction records that match parameters provides via the transaction search/monitor web page 710 described above. The selected transaction records are formatted into the search results web page 810 which is then transmitted to the user computer over the data network. The search results web page 810 shown in the diagram 800 indicates that four transaction records 816 were selected from the transaction data base that match query parameters. Note that the search results

web page restricts access only to account data, as is indicated via the account number field 812. Yet, access to billing records for more than one line is indicated by different entries in the calling number fields 814. It is also notable that individual transactions records 816 are distinguishable when the present invention is employed to view a telecommunications account online. In contrast to summary level information, the transaction details provided in accordance with the present invention allow significant analyses to be performed by a user—without having to wait for a detailed bill to be sent by mail.

Now referring to FIGURE 9, a flow chart 900 is presented illustrating a method according to the present invention for providing online access to near-real-time details and charges corresponding to a telecommunications account.

The method begins at block 902 wherein a transaction message is provided to a network operations center over a data network. Flow then proceeds to block 904.

At block 904, the transaction message is received by a web server in the network operations center. Flow then proceeds to decision block 906.

At decision block 906, the transaction message is evaluated to determine if the transaction message corresponds to a new telecommunications event that has occurred. If so, then flow proceeds to block 908. If not, then flow proceeds to decision block 910.

At block 908, the transaction message describing the new telecommunications event is provided to a billing server. The billing server generates a new transaction record for the new telecommunications event based upon details provided by the new transaction message. The new transaction record is inserted into a telecommunications transaction data base in the billing server. Flow then proceeds to block 920.

At decision block 910, the transaction message is evaluated to determine if it is a batch process message. If so, then flow proceeds to block 912. If not, then flow proceeds to block 914.

At block 912, the batch process message directs the billing server to generated periodic billing files for all user accounts. As a result, a sequence of queries is performed on the data base to generate bills for each account covering a period prescribed by the batch process message. Transaction records corresponding to each of the sequence of queries are used to generate and store billing information in the data base. Flow then proceeds to block 920.

At block 914, it is determined by default that the transaction message is a transaction search message containing search parameters. The transaction search message has been generated in response to a user request for information provided over a data network via a web browser. Consequently, query logic within the billing server executes a query of the data base in accordance with the search parameters. Transaction records are retrieved from the data base that match the search parameters. Flow then proceeds to block 918.

At block 918, the retrieved transaction records are formatted into a query result web page and are transmitted

over the data network to the user. Flow then proceeds to block 920.

At block 920 the method completes.

Although the present invention and its objects, features, and advantages have been described in detail, other embodiments are encompassed by the invention. The present invention has been particularly characterized by access to billing records via the Internet data network. Although the Internet is widely used today for communication between computers, the present invention is not dependent upon such capability being provided. The data network employed to access a billing server according to the present invention can be embodied as any public or private network utilizing proprietary or leased communication channel assets.

In addition, the present invention has been particularly characterized in terms of specific details that are commonly used to determine the cost of a telecommunication event such as time, location, and etc. In addition to such details, the present invention also comprehends other criteria for charge determination that may

require presence in a transaction record such as the type of telephonic device employed to execute a particular transaction event.

Furthermore, the present invention has been specifically described with reference to providing online access to transaction records relating to events that take place over a telephone network between devices having telephone numbers. Yet, improvements in the art may soon prove to allow telecommunication events to transpire between devices having some other form of addressing, such as an IP address. And the events may occur over a data network rather than the telephone network. The present invention comprehend such improvements to the extent that individual transactions can be distinguished within a billing data base.

Those skilled in the art should appreciate that they can readily use the disclosed conception and specific embodiments as a basis for designing or modifying other structures for carrying out the same purposes of the present invention without departing from the spirit and scope of the invention as defined by the appended claims.